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SCIENCE

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THE MISSION OF SCIENCE IN EDUCATION.*

THE average graduate from an American university needs no counsel as to his conduct when he comes to face 'the untried world.' He has had his eyes open, and has tried the world more or less, often too much; and has already been surcharged with advice from those of larger experience. If he does not know the elements of success, it is not because he has failed to hear of them; and it only remains for him to receive the teaching which comes from experience. I address these graduates, therefore, with the consciousness that it is too late to add effective advice, and too early to appeal to their experience. I come, therefore, not to youths who are about to be sent away for the first time from the fostering care of a mother, but to university men and women, interested in whatever concerns higher education, and I wish to speak to them of the mission of science in education.

In its broadest sense science includes all knowledge, but the reference here made is to the ordinary application of the word in schemes of education. Perhaps even this needs limitation, if by chance any one has confused reading about science with scientific training; for reference is made to science taught by the laboratory method, which merely means direct and personal contact with the subject matter.

* An address delivered at the annual commencement of the University of Michigan, June 21, 1900.

In explanation, it is postulated that the blood pressure increases and the blood vessels and smooth muscular fibers contract in order to prevent the blood from collecting in the abdominal cavity, the brain requiring additional blood pressure for its additional activity—regulated by the sympathetic nervous system.

Mosso is right in denying in this lecture teleology to the reflex phenomena of strong emotions, but he is wrong in statements as to Darwin's theory, for this the latter never claimed for strong affective states. It is the excitement, and not the mode, of the emotion (pleasant or unpleasant) which, in case of the bladder, determines the loss of organic equilibrium. This is a conclusion easy to accept when we consider that one of the functions of the visceral blood vessels is to be a reservoir for blood necessarily expelled from other bodily parts.

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SCIENTIFIC JOURNALS AND ARTICLES.

The Journal of Comparative Neurology, May, 1900. The first article, 'Observations on Sensory Nerve Fibers in Visceral Nerves, and on their Modes of terminating,' by Dr. G. Carl Huber, details observations made upon the innervation of the hollow viscera by means of methylene blue intra-vitam. This is followed by a short note by the same author on 'Sensory Nerve Terminations in the Tendons of the Extrinsic Eye-muscles of the Cat,' the organs being somewhat different from the ordinary neuro-tendinous spindles found in the other skeletal muscles. Dr. Huber and Mrs. Lydia M. DeWitt follow with a paper of 50 pages and six plates entitled 'A Contribution on the Nerve Terminations in Neuro-tendinous End-organs,' describing the structure of these sense organs as studied by the methylene-blue method in amphibians, reptiles, birds and mammals. In all cases the tendons are supplied with a special nerve end-organ consisting of several tendon fasciculi, embryonic in nature, which in birds and mammals are generally surrounded by a connective tissue capsule, while they are usually not so surrounded in reptilia, and never in amphibia. They are generally, but not always,

innervated by a single non-medullated nerve fiber, which, after repeated branching, ends in one or many tufts of non-medullated fibers, the details of whose structure vary with the different animals studied. Dr. H. H. Goddard describes and figures a new brain microtome recently made at Clark University for cutting entire human brains. F. J. Cole, of University College, Liverpool, gives a prospectus of 'A Proposed Neurological Bibliography of the Ichthyopsida.' 'The Number and Size of the Nerve Fibers Innervating the Skin and Muscles of the Thigh in the Frog,' by Elizabeth Hopkins Dunn, M.D., demonstrates that the fibers innervating the thigh are more numerous and of greater average caliber than those innervating the rest of the leg. Hence in the frog the fibers of greater diameter run the shorter course. About 8 per cent. of the fibers which innervate the thigh divide, one division running on into the lower leg. Dr. H. Heath Bawden gives 'A Digest and a Criticism of the Data upon which is based the Theory of the Amoeboid Movements of the Neurone,' accompanied by a bibliography of 115 titles. The usual book notices complete the number.

THE July number (Vol. I., No. 3) of the *Transactions of the American Mathematical Society* contains the following articles: 'Wave propagation over non-uniform conductors,' by M. I. Pupin, of New York, N. Y.; 'Ueber Systeme von Differentialgleichungen denen vierfach periodische Functionen Genüge leisten,' by M. Krause, of Dresden, Germany; 'On linear criteria for the determination of the radius of convergence of a power series,' by E. B. Van Vleck, of Middletown, Conn.; 'On the existence of the Green's function for the most general simply connected plane region,' by W. F. Osgood, of Cambridge, Mass.; 'D lines on quadrics,' by A. Pell, of Vermillion, So. Dak.; 'Sundry metric theorems concerning n lines in a plane,' by F. H. Loud, of Haverford, Pa.; 'An application of group theory to hydrodynamics,' by E. J. Wilczynski, of Berkeley, Cal.; 'Determination of an abstract simple group of order $2^7 \cdot 3^6 \cdot 5$. 7 holodrically isomorphic with a certain orthogonal group and with a certain hyperabelian group,' by L. E. Dickson, of Austin, Tex.

DR. JOHN GUITERAS, who resigned the chair of pathology in the University of Pennsylvania to fill a similar position in the University of Havana, has established there a journal entitled *Revista de Medicina Tropical*.

DISCUSSION AND CORRESPONDENCE.

THREE FORGOTTEN NAMES FOR BIRDS.

IN *Museum Leskeanum Regnum animale quod ordine systematico disposuit atque descripsit*, D. L. Gustavus Karsten, Vol. I., Leipzig, are proposed three names for birds which appear to have been overlooked by ornithologists, at least since 1817. The names are *Certhia longicauda*, *Trochilus maximus*, and *Pipra tricolor*, all of Karsten. Viellot (*Nouveau Dictionnaire d'Histoire Naturelle*, * * * Nouv. ed., T. VII. (1817), p. 364) refers to *Trochilus maximus* giving the proper reference to Karsten's work, but curiously enough gives Latham as the authority for the species.

While these names have not been noted in recent works it seems they do not affect any now in use in ornithologic nomenclature. This statement is made on the authority of Mr. Witmer Stone of this Academy.

From a bibliographic standpoint it would be interesting to know whether the *Museum Leskeanum Regnum Animale* (1798) consists of one or two volumes. Most bibliographers, to whom I have referred, say two volumes; but Cuvier (*Le Regne Animal*, nouv. ed., T. III. (1830) gives but one volume. In the library of the Academy of Natural Sciences of Philadelphia there is volume I. only of the work, which is divided into six classes, viz, Mammalia, Aves, Amphibia, Pisces, Insecta, Vermes, the latter including the invertebrates except the insects, from which it will appear evident that nothing remains of Animalia to be treated in another volume. The first 44 pages (classes I.-IV.) of the work are numbered in Roman, and parts V. and VI. are numbered independently, and are in Arabic (pp. 1-320). To this difference in pagination may be due the statement that the work is in two volumes. Or the fact that Classes V., Insecta (pp. 1-136), was published in advance in 1788 with a separate title-page may account for the other volume.

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NOTES ON INORGANIC CHEMISTRY.

THERE has been a question frequently discussed as to the delicacy of spectroscopic reactions as compared with the sense of smell. Kirchhoff and Bunsen were able by the spectroscope to detect $1/14 \times 10^{-6}$ mg. of sodium; on the other hand, E. Fischer and Penzoldt could recognize the odor of $1/460 \times 10^{-6}$ mg. of mercaptan. It was clear, however, that the figures of Bunsen by no means represented the limit, and Professor F. Emich of the Technische Hochschule of Graz has lately devoted some time to the study of the problem. His results are published in the *Sitzungsberichte* of the Academy of Science of Vienna. His method is to use Geissler tubes with exceedingly fine capillary portion; these are filled with hydrogen under greatly diminished pressure. A slit at right angles to the capillary allows the light from a limited portion of substance to pass, the weight of which is easily calculated. The lowest pressure at which the line *H* is visible was observed and from this the calculation made. The results obtained in three observations were 1×10^{-12} mg., 7×10^{-14} mg. and 3×10^{-13} mg. It thus appears that, on the average, the quantity of hydrogen recognizable by the spectroscope is ten thousand times less than that of mercaptan by the sense of smell. Emich calls attention to the fact that if, as Hutton affirms, the ordinary hydrogen spectrum is visible only when the gas contains a trace of oxygen, the quantity of oxygen thus detected by the spectroscope becomes far more minute than the figures given for hydrogen.

THE subject of the radio-active substances in pitchblende continues to excite the interest of chemists, and much work is being done by the two Curies, Giesel, Debierne, Becquerel, von Lengyel and others. The last number of the *Chemical News* contains a paper by Béla von Lengyel of Budapest, describing his efforts to prepare a radio-active barium synthetically. His process is to fuse together uranyl nitrate with two or three per cent. of barium nitrate, and then fuse the oxides obtained in the electric arc. The fused mass is dissolved in nitric acid, much of the barium nitrate crystallized out, and the remainder of the barium precipitated as the sulfate. The sulfate thus obtained